A

Major Project Report

On

LANGUAGE CONVERTOR USING PYTHON

(Submitted in partial fulfillment of the requirements for the award of Degree)

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING

By

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CMR TECHNICAL CAMPUS

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2018-2022

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the project entitled "**LANGUAGE CONVERTOR USING PYTHON**" being submitted by **G. ADITI SAI(187R1A0580), K.GOPI KRISHNA(187R1A0591), K.RATAN(187R1A0588)** in partial fulfillment of the requirements for the award of the degree of B.Tech in Computer Science and Engineering to the Jawaharlal Nehru Technological University Hyderabad, is a record of bonafide work carried out by him/her under our guidance and supervision during the year 2021-22.It is certified that they have completed the project satisfactorily.

The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.

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ABSTRACT

Speech is the most natural form of human communication. Communication is needed to delivery information. The language which is used as a communication to interact between others. But not everyone has the same language to communicate; there are many languages from different countries of the world. An average person speaks 11000–25000 words per day making speech the most common way of expressing ourselves. Be it a conversation, dialogue, speech, presentations or any general talks, we use speech to make other as well as ourselves understand thoughts and actions. If either of the side is unaware of the language of communication, the cycle will be incomplete.

In the present industry, communication is the key element to progress. Passing on information, to the right person, and in the right manner is very important, not just on a corporate level, but also on a personal level. If either of the side is unaware of the language of communication, the cycle will be incomplete. Hence we need a system that can bridge this language barrier. Speech to speech translation is one such system that can play important role by facilitating communication between persons speaking different languages.

LIST OF FIGURES

LIST OF SCREENSHOTS

TABLE OF CONTENTS

1. INTRODUCTION

1.INTRODUCTION

1.1 PROJECT SCOPE

This project is titled as "Language convertor using python" to convert the audio input of one language to another language. Speech Speech-to-speech (S2S) translation is a complex process designed to assist communication between individuals that speak different languages translation technology is selected as one of the ten technologies that will change the world. There may be people who are struggling to understand other people due to language barrier. For that type of people it will be useful.

1.2 PROJECT PURPOSE

Around this world there are huge number of people speaking different types of languages. Communication is needed to delivery information. The language which is used as a communication to interact between others. But not everyone has the same language to communicate; there are many languages from different countries of the world. So by this system we can provide the facility of translation of one language to another language such that people can understand the things. Consider we have a YouTube video of a particular language(i.e. Spanish)which a person wants to understand it, but that person is unaware about the language spoke. By using language convertor we can help that person to translate the YouTube video into the language the person can understand.

1.3 PROJECT FEATURES

- Speech convertor technology which recognizes the user's speech input and converts into source language text or the technology to recognize speech.
- Machine translation which translates source language audio into the target language audio.
- Speech synthesis or Speech-to-speech synthesis which converts translated audio into speech or the technology to synthesize speech in the other person's language. In addition, the technology understands natural language and also plays an important role in this speech-to-speech translation system.

1.4 GOALS

The main objective of this research work is to create an efficient system that is able to deliver an output audio of the preferred language by the user. Thus the goals below can be derived from this:

- The system should be able to recognize user voice.
- The system must be able to convert input text to output text using translator.
- The system must be able to save the audio in a file
- The system must work for all types of languages.
- The system must be able to play the saved mp3 file
- The system must be able to convert output text to audio form.

2. SYSTEM ANALYSIS

2.SYSTEM ANALYSIS

SYSTEM ANALYSIS

System analysis is the important phase in this process. The System is studied to the minute details and analyzed. The system analyst plays an important role of an interrogator and dwells deep into the working of the present system. In analysis, a detailed study of these operations performed by the system and their relationships within and outside the system is done. A key question considered here is, "what must be done to solve the problem?" The system is viewed as a whole and the inputs to the system are identified. Once analysis is completed the analyst has a firm understanding of what is to be done.

2.1 PROBLEM DEFINATION

In the present industry, communication is the key element to progress. Passing on information, to the right person, and in the right manner is very important, not just on a corporate level, but also on a personal level. If either of the side is unaware of the language of communication, the cycle will be incomplete. Hence we need a system that can bridge this language barrier. Speech to speech translation is one such system that can play important role by facilitating communication between persons speaking different languages.

2.2 EXISTING SYSTEM

There have been methods for speech to speech conversion. In traditional methods for understanding other language people used to take help of humans(who knows about the language) as a barrier. In olden days there was human interaction involved to make communication between people who spoke or who understand different types of languages.In our Modern period applications were develeoped for speech conversion to understand languages which a person is unaware.

2.2.1 DISADVANTAGES OF EXISTING SYSTEM

- Applications did'nt include all the languages
- Due to human Interaction time management was low
- Background voice Interference
- Limited Vocabulary

2.3 PROPOSED SYSTEM

To overcome the issues discussed in existing system We are coming up with a system that converts audio of a particular language into audio of another language that is preferred by a user using python i.e we are building a language convertor. Here human interaction is not necessary. We will be using googletrans , speech_recognition,pyaudio and other packages to finish this project.

2.3.1 ADVANTAGES OF PROPOSED SYSTEM

- No human Interaction required
- More Efficient(Includes all languages)
- Provide significant help for the people with disabilities.
- Requires less consumption of time.
- It is time saving and has less errors as compared to the previous system.
- High performance.

2.4 FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. Three key considerations involved in the feasibility analysis are

- Economic Feasibility
- Technical Feasibility
- Behavioural Feasibility.

2.4.1 ECONOMIC FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

2.4.2 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

2.4.3 BEHAVIOURAL FESAIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

2.5 HARDWARE & SOFTWARE REQUIREMENTS

HARDWARE REQUIREMENTS:

Hardware interfaces specifies the logical characteristics of each interface between the software product and the hardware components of the system. The following are hardware requirements.

Processor : Intel i3 and above

RAM : 4GB And higher

Hard Disk : 50GB(Minimum)

SOFTWARE REQUIREMENTS:

Software Requirements specifies the logical characteristics of each interface and software components of the system. The following are software requirements.

Operating System : Windows 7 and above

Programming Language : Python 3.10

IDE : Pycharm

2.6 PROJECT DESCRIPTION

The project gives an detailed explanation about how audio of one language is converted into audio of another language. Initially the user will be inputting the audio in any language(say Spanish).Now the task is that we need to convert this input audio into a language preferred by user(say English).to do this firstly we will take the input audio and convert it into text format. Now before converting it into output audio initially we need to convert input text to output text. We will be using Google translator to convert this input text into output text. After than we will convert that particular output text into audio and that audio will be listened by the user using playsound.gtts,google trans,speech_recognition are the other packages used to finish this project.

In this project we will be using try and except blocks to run our code. After conversion of input audio into text it will be displayed on screen and after translation of input text to output text ,output text will also be displayed on screen and output audio will be listened by the user.

3. ARCHITECTURE

3.ARCHITECTURE

3.1 PROJECT ARCHITECTURE

This project architecture shows the procedure followed for Language convertor using python.

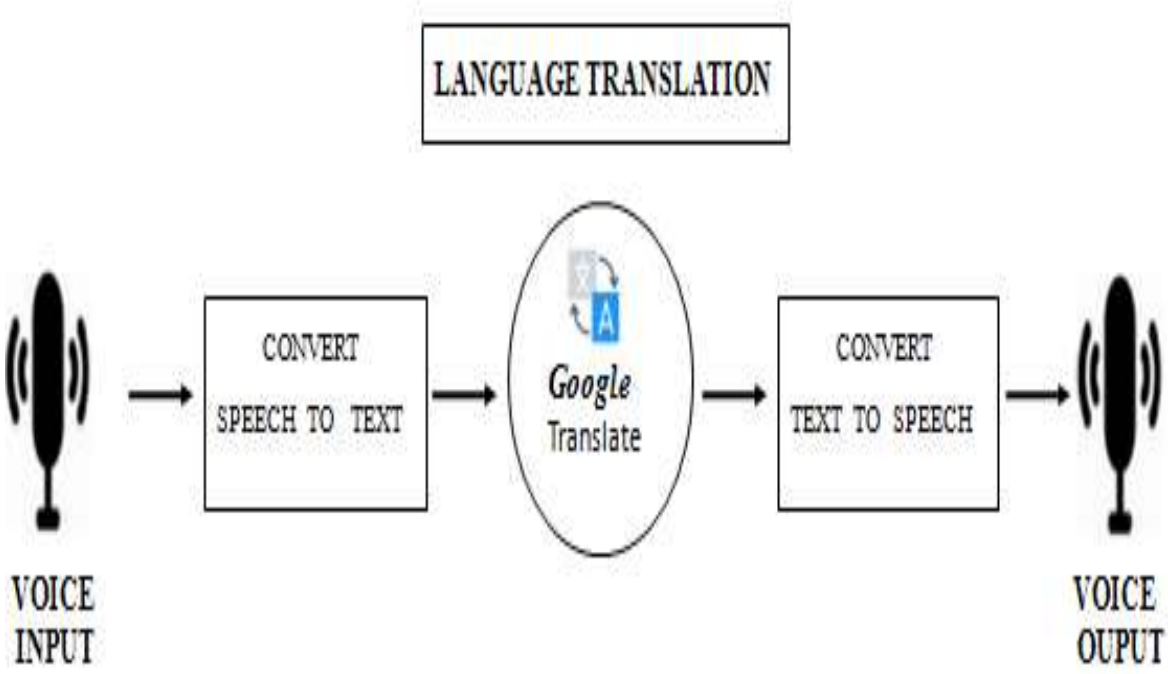


Figure 3.1 Project Architecture for Language convertor using python

3.2 DESCRIPTION

Project Architecture means what are the layers in our project with flow diagram.This project architecture shows the procedure followed for Language convertor using python. The main aim of this project is to convert the language spoken by a personinto another language audio .For that initially we need to give voice input .consider that we are giving our voice input in Hindi language and we need output language as English.what the system will do is initially it will enable the microphone. Then by using recognizer.listen() it will recognize our voice and store in variable “voice”. Then the recognized input voice

will be converted into text using “recognizer.recognize_google()” and converted text will be stored in “text” variable. This is what happens in “Convert Speech to Text” block.Next we will be using Google Translate to convert this input text into text of output language i.e. English. Now the output text has been obtained now we have to convert this output text into speech form.We will be using gtts.gTTS() to convert the output text into speech.We will save this audio output in an mp3 file. Then we will use playsound.playsound() to play the audio output obtained.This is what basically happens in “convert text to speech” block.Then audio output will b obtained. The above one is the procedure followed for the conversion of input audio into output audio.

In the output ,two statements will be visible on the console. Firstly the input audio will be converted into text andit will be printed on the console. Then the input text will be converted into output text and the output text will be visible on console.Then output audio which was obtained from output text will be listened using playsound.This explains the flow i.e. what happens in a system.This project was done in python language using pycharm tool.

3.3 USE CASE DIAGRAM

Its purpose is to present a graphical overview of the functionality provided by a system in terms of actions, their goals represented as use cases and any dependencies between those use cases. Here the functionality of the model is that user needs to give his voice input then using certain logics and packages the output audio will be obtained.

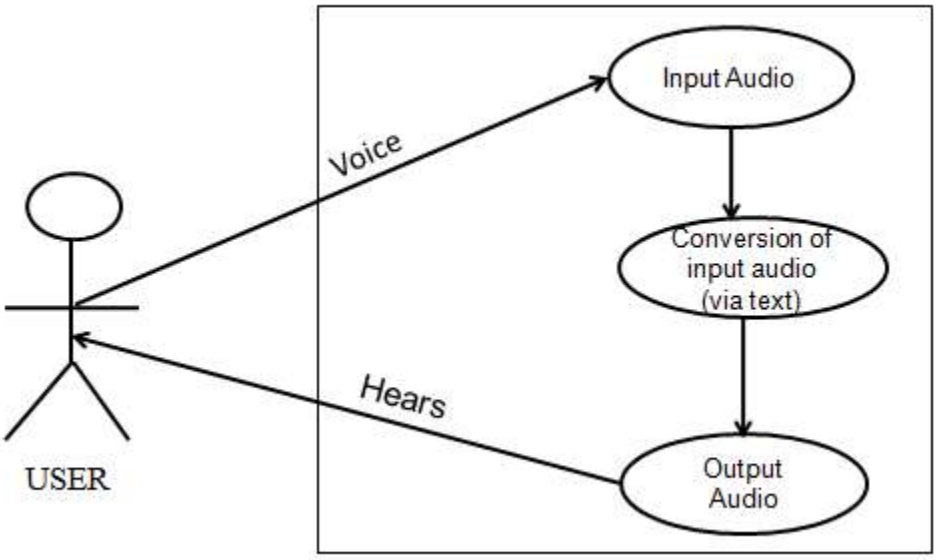


Figure 3.2 Use Case Diagram for Language Convertor using python

3.4 CLASS DIAGRAM

It describes about the structure by showing the system classes, their attributes, operations and the relationship among the classes. It explains about the information of the classes. In this "Language convertor using python" project we take class names as User, Text_Conversion, Speech_Conversion, Output.

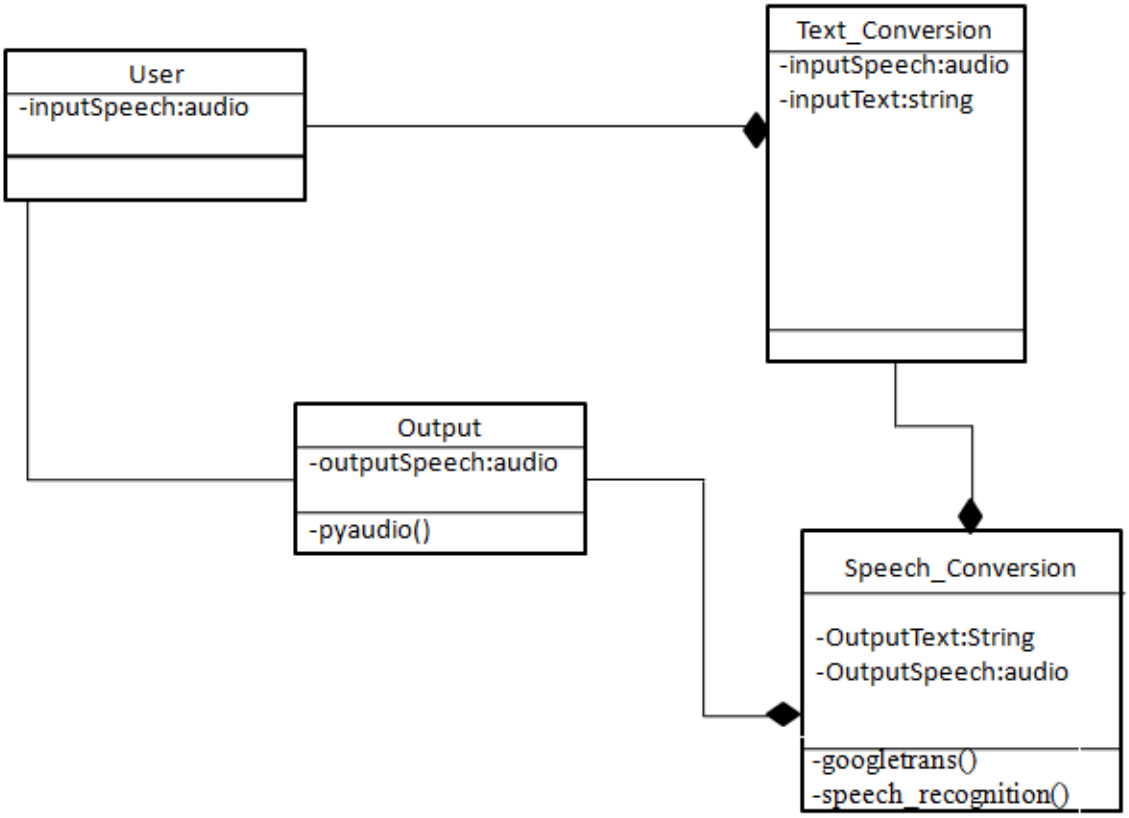


Figure 3.3 Class Diagram for Language Convertor using python

3.5 SEQUENCE DIAGRAM

It is used to represent the objects that are participating the interaction horizontally and time vertically. The sequence of the messages between the objects will show the functionality carried out in the model. .Each use case specifies some behavior,possibly including variants that the subject can perform in collaboration with one or more.

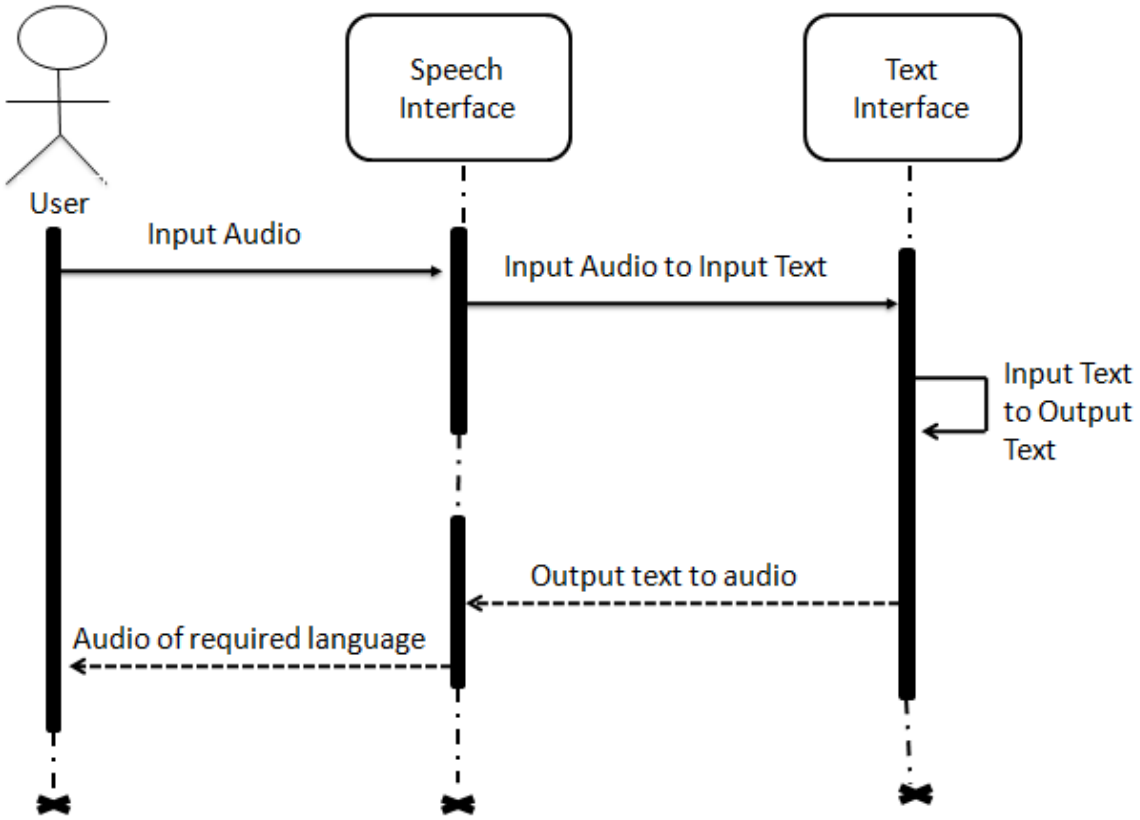


Figure 3.4 Sequence Diagram for Language convertor using python

3.6 ACTIVITY DIAGRAM

This is used to describe the step-by-step workflows of components in a System. An Activity Diagram shows the over flow of the control. Here it explains how input audio is converted into the output audio. The output audio will be in the language that is prefered by the user.

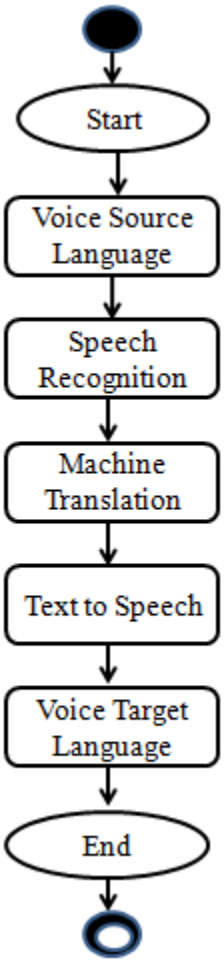


Figure 3.5 Activity Diagram for Language convertor using python

4. IMPLEMENTATION

4.IMPLEMENTATION

Project implementation (or project execution) is the phase where visions and plans become reality. This is the logical conclusion, after evaluating, deciding, visioning, planning, applying for funds and finding the financial resources of a project. Technical implementation is one part of executing a project. Project implementation involves directly managing a project to ensure it meets the objectives outlined in the planning phase. Implementation is the carrying out, execution, or practice of a plan, a method, or any design, idea, model, specification, standard or policy for doing something. As such, implementation is the action that must follow any preliminary thinking in order for something to actually happen. Implementing projects is important because it can reveal new issues and challenges that planners may not have anticipated, ultimately resulting in more refined strategies, products and processes.

In this project we genrally start by defining the problem statement,researching about its existing systems and then we take disadvantages of existing system into consideration and then propose a new system.At the end of the project,the system must be ready in such a way that user can make use of it.Initially we take the required input audio convert it into text form using recognizer and then convert that input text into output text then into output audio using google translator andother required functions.After everything is completed the final output text will be visible on the screen and output audio will be played by the system.

4.1 SAMPLE CODE

Sample code basically explains the way in which we executed our project.What are all the packages and what are all the methods used to complete our project,this all things are explained in this project.We have done this project using python language and we used pycharm tool.

```
import googletrans
import speech_recognition as sr
import gtts
import playsound
recognizer = sr.Recognizer()
```

```
translator = googletrans.Translator()
input_lang = 'fr-FR'
output_lang = 'en'
try:
    with sr.Microphone() as source:
        print('Speak Now')
        voice = recognizer.listen(source)
        text = recognizer.recognize_google(voice, language=input_lang)
        print(text)
except:
    pass

translated = translator.translate(text, dest=output_lang)
print(translated.text)
converted_audio = gtts.gTTS(translated.text, lang=output_lang)
converted_audio.save('romantic.mp3')
playsound.playsound('romantic.mp3')
# print(googletrans.LANGUAGES)
```

4.2 LIBRARIES

- **Googletrans:** Googletrans is a free and unlimited python library that implemented Google Translate API. This uses the Google Translate Ajax API to make calls to such methods as detect and translate. Googletrans is a free python library that uses Google Translate API. To install this either use things like pip with the package “googletrans” or download the package and put the “googletrans” directory into your python path.

- **Speech_recognition:** Speech recognition is a machine's ability to listen to spoken words and identify them. You can then use speech recognition in Python to convert the spoken words into text, make a query or give a reply. You can even program some devices to respond to these spoken words. The easiest way to install this is using pip install SpeechRecognition. Otherwise, download the source distribution from PyPI, and extract the archive. In the folder, run python setup.py install.

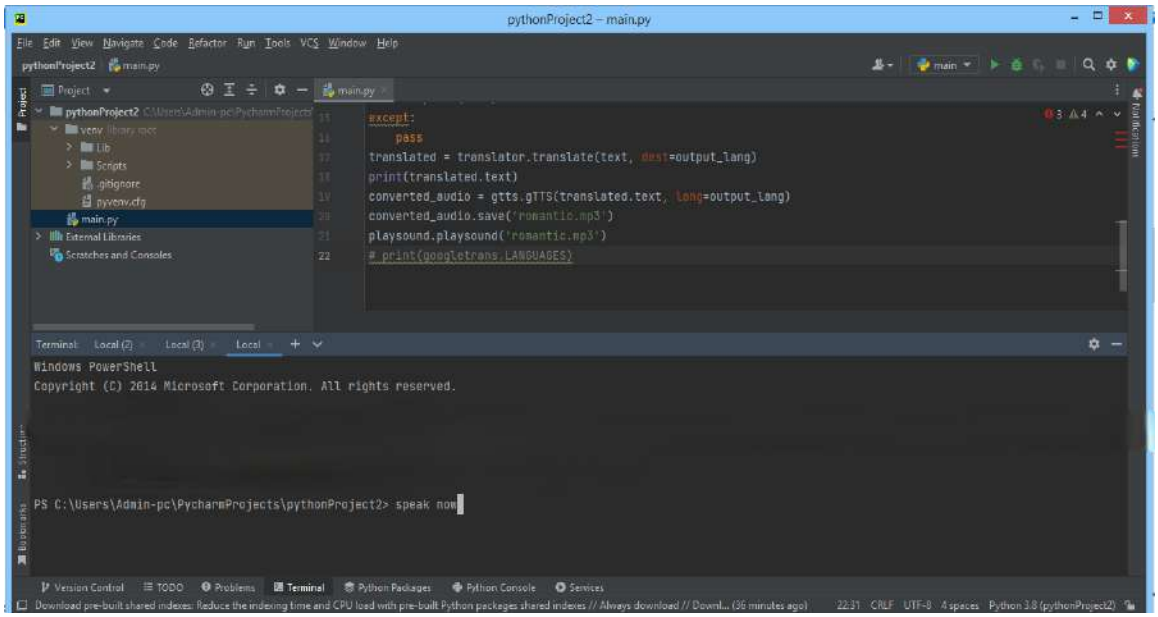
- **gTTs:** gTTS (Google Text-to-Speech)is a Python library and CLI tool to interface with Google Translate text-to-speech API. We will import the gTTS library from the gtts module which can be used for speech translation. Customizable speech-specific sentence tokenizer that allows for unlimited lengths of text to be read, all while keeping proper intonation, abbreviations, decimals and more.
- **playsound**: playsound is a "pure Python, cross platform, single function module with no dependencies for playing sounds." With this module, you can play a sound file with a single line of code: from playsound import playsound playsound('myfile.wav').The playsound module is the simplest module to use for playing sound. This module works on both Python 2 and Python 3, and is tested to play wav and mp3 files only.

5. SCREENSHOTS

5.SCREENSHOTS

5.1 DISPLAY SCREEN

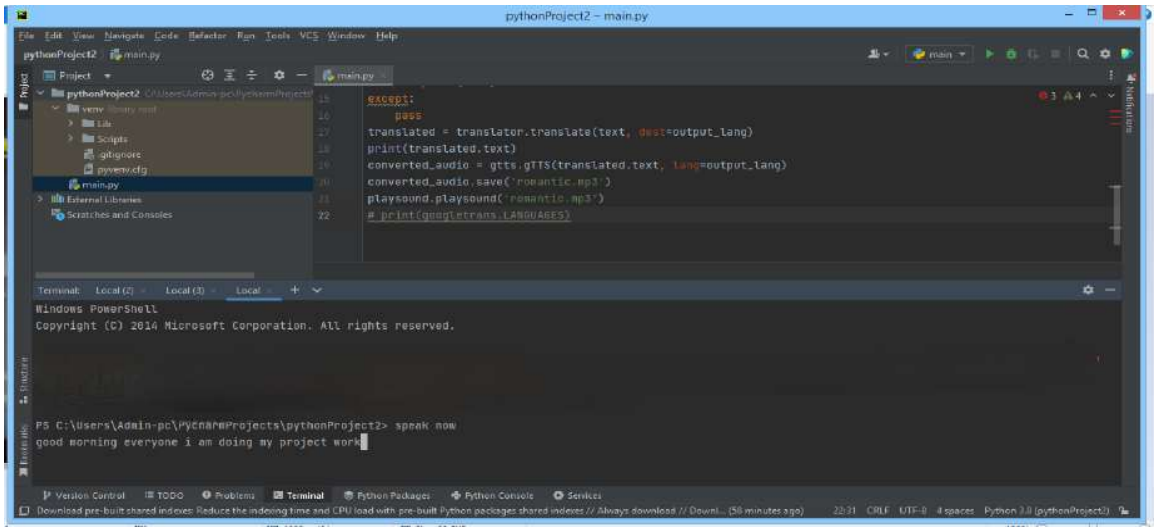
As soon as we compile the code "speak now" message appears on screen.



Screenshot 5.1 Display Screen for language convertor using python

5.2 INPUT SCREEN

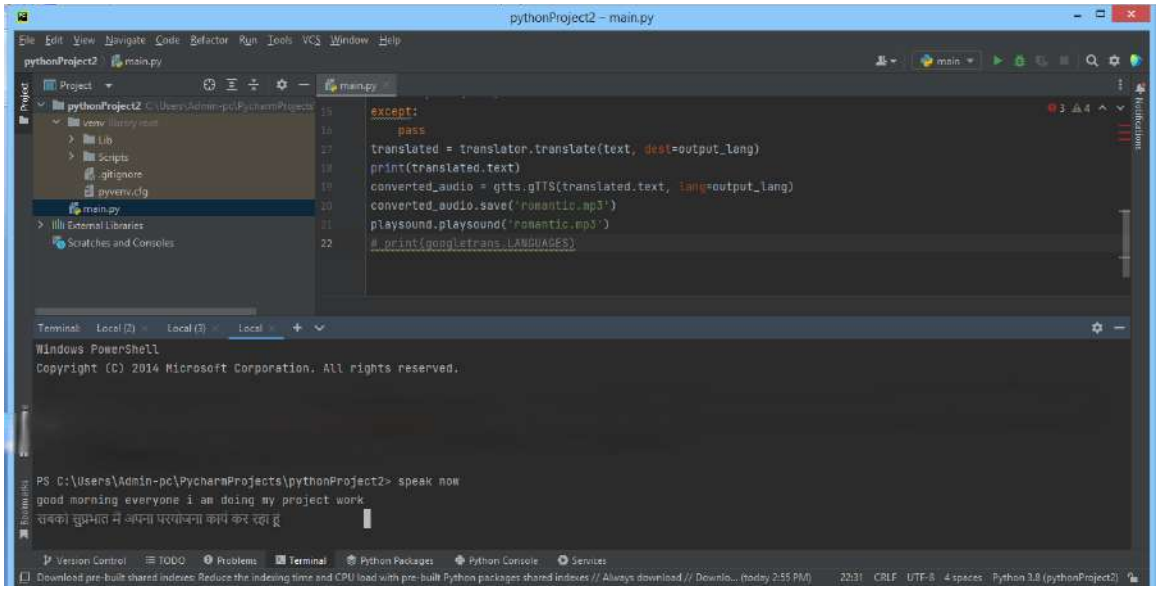
After "speak now" message appears, we need to speak something of any language(say english) and it will appear on screen



Screenshot 5.2 Input Screen for language convertor using python

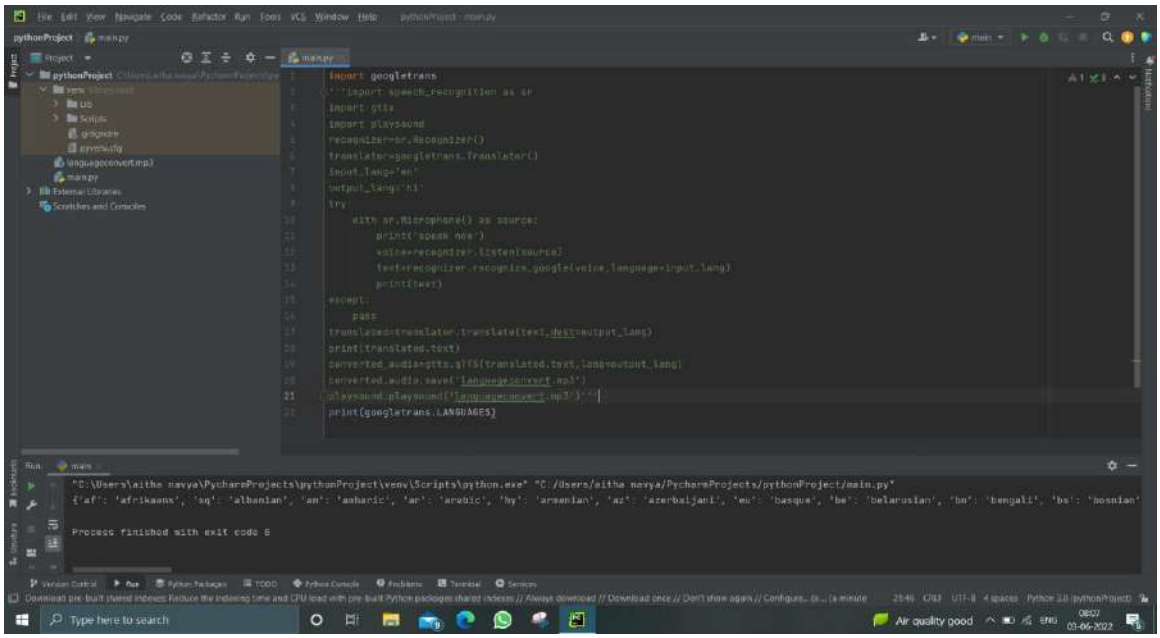
5.3 OUTPUT SCREEN

Now that english text will be converted into text of another language preferred by user (say hindi) and it will be displayed on screen and audio of output text will be played.



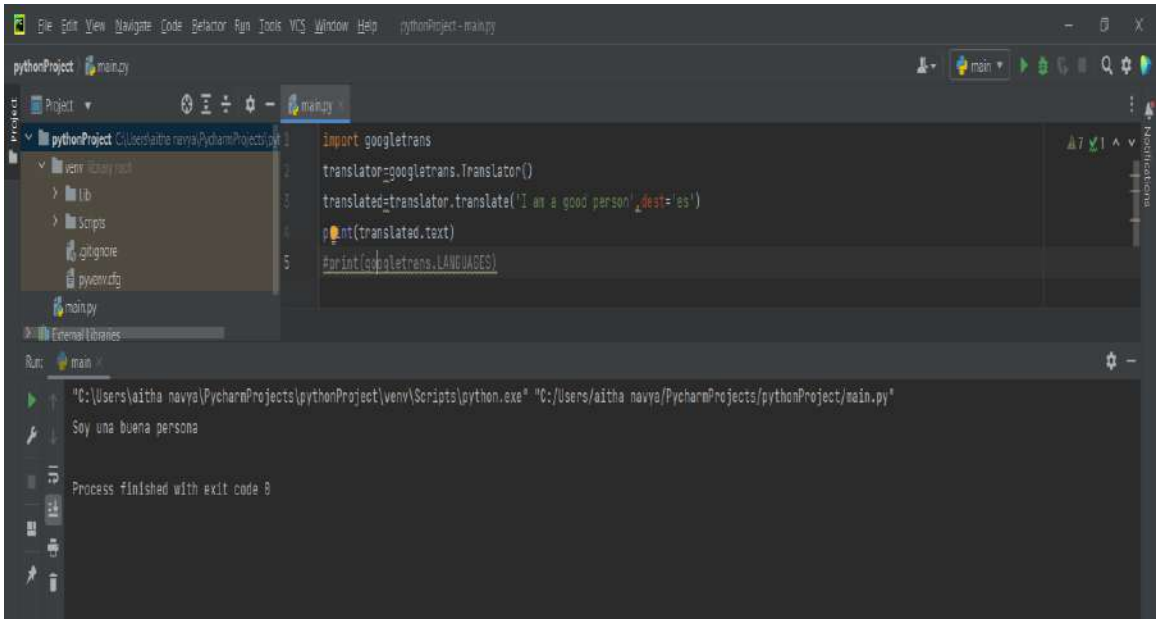
Screenshot 5.3 Output screen for language convertor using python

5.4 CODE SNIPPET



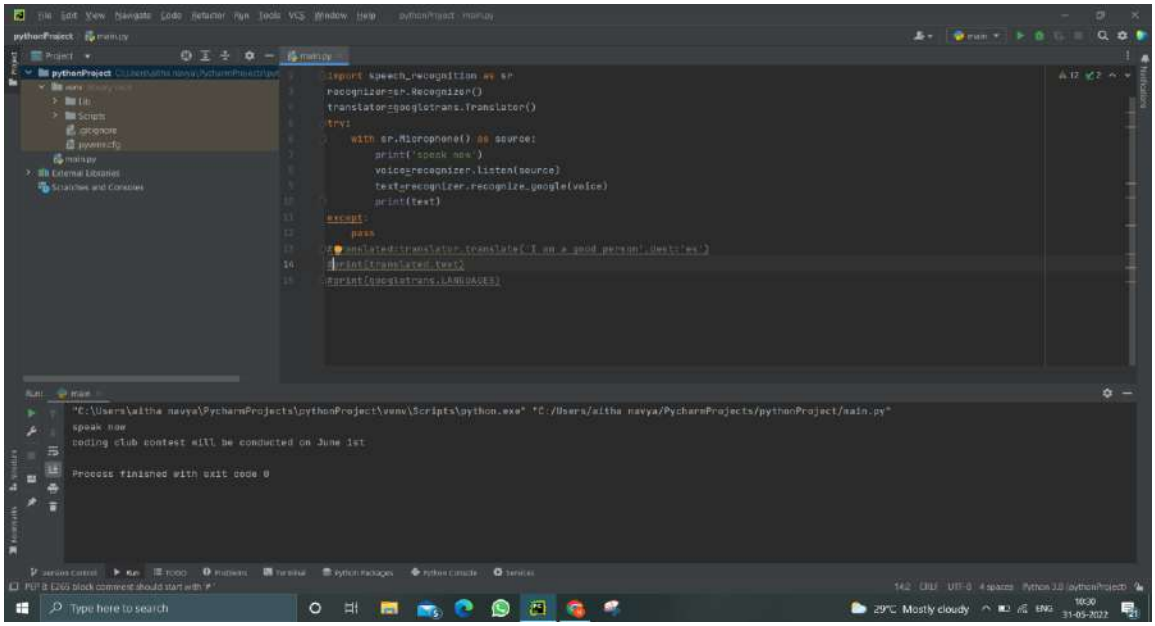
Screenshot 5.4 Languages Available for language convertor using python

The above screenshot explains about the languages available for translation. For this we need to import googletrans library and print all the languages using "googletrans.LANGUAGES".As we click on run button all the languages that are available for conversion will be displayed on the screen.



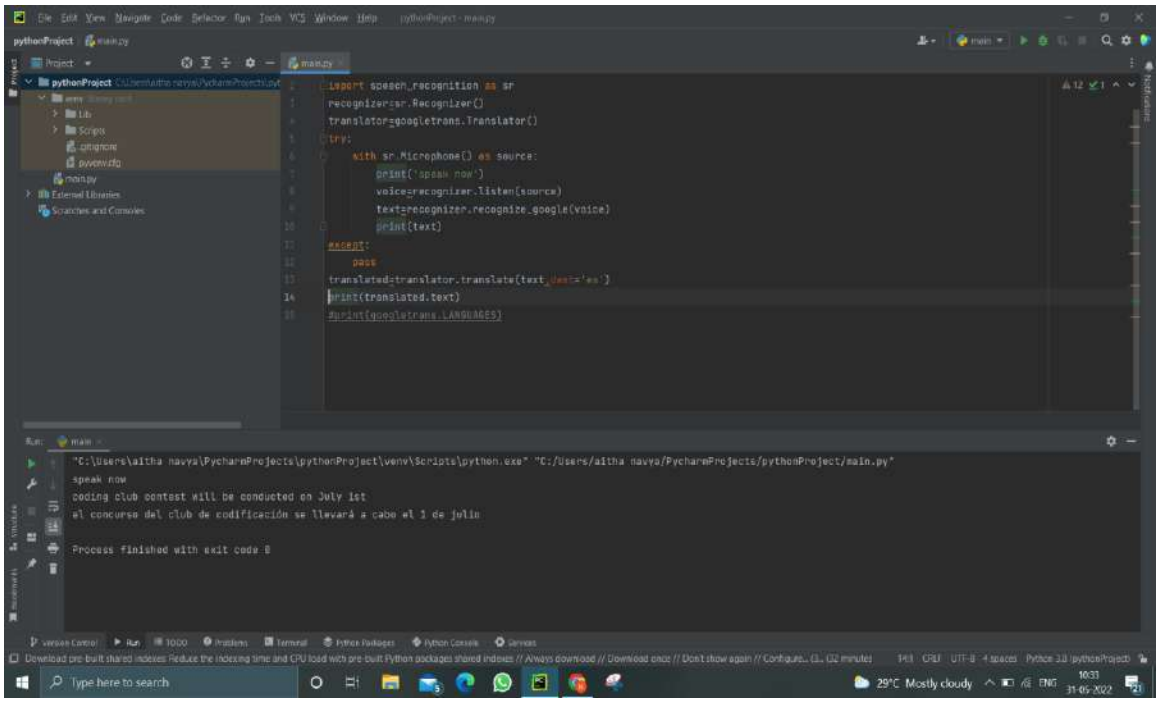
Screenshot 5.5 Input text conversion for language convertor using python

The above screenshot explains about the input text conversion. Here we will be converting out input text that is given by a user in any language into text format of the destination language and display it on the screen. We can observe sentence written in spanish language in console.. Initially here we will be giving our input text in english language and we will also mention the destination language. Destination language is mentioned using dest variable. We should not specify name of the language ,we should just give the code of the particular language. For spanish the code is "es". After running our code the input text will be converted into destination language and it will be visible on screen.



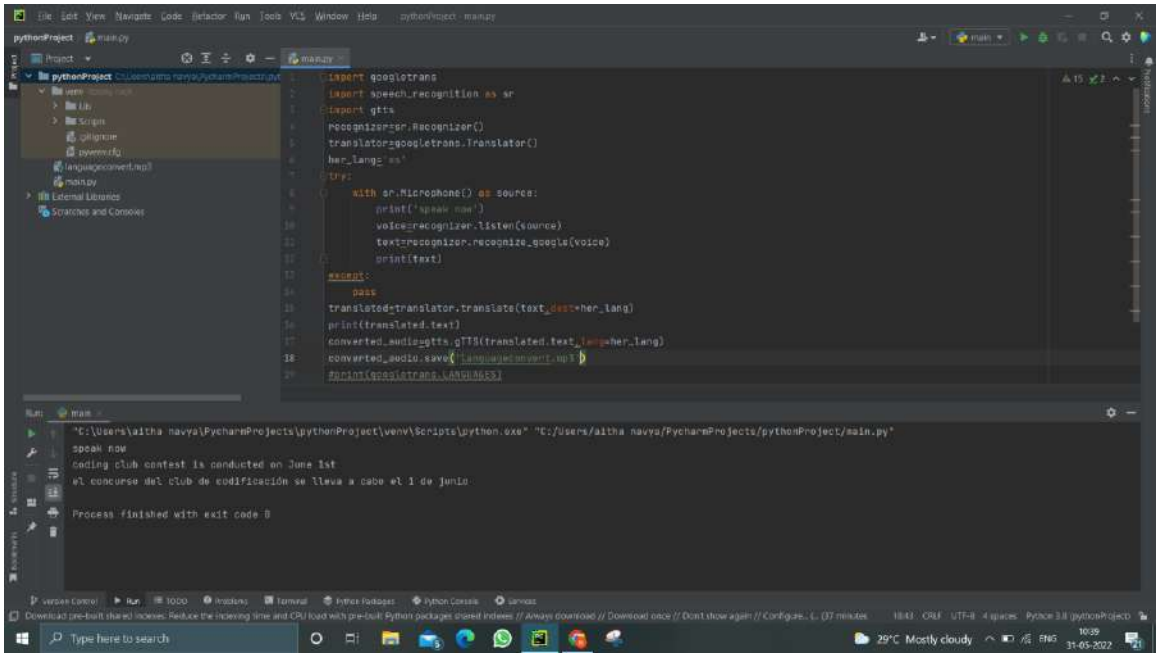
Screenshot 5.6 Input Audio displayed for language convertor using python

In the above screenshot it explains about the input audio displaying.. A message "speak now" will be popped up on the screen and as soon as that message appears on the screen we need to speak something(say in english). Using voice recognizer and microphone our system will listen to the sentence spoken by user and it will be displayed on screen.



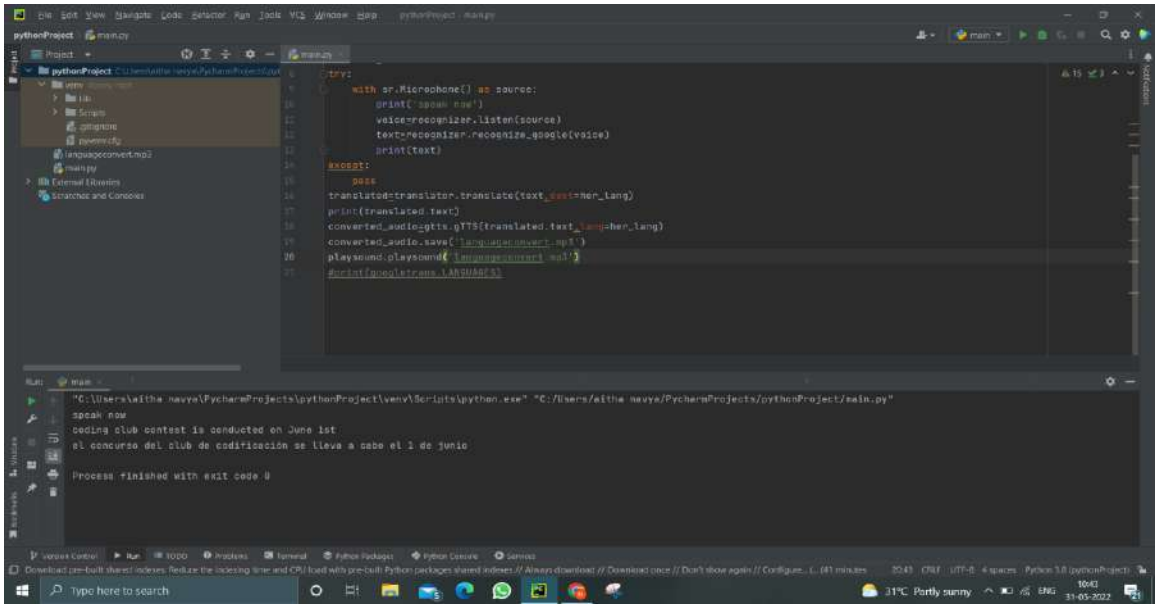
Screenshot 5.7 Output language for language convertor using python

The above screenshot explains about the output language that is obtained. Here initially we will click the run button then "speak now" message appears on the screen. Then the audio spoken by the user will be displayed on the screen and also the destination language output will also be displayed on the screen.



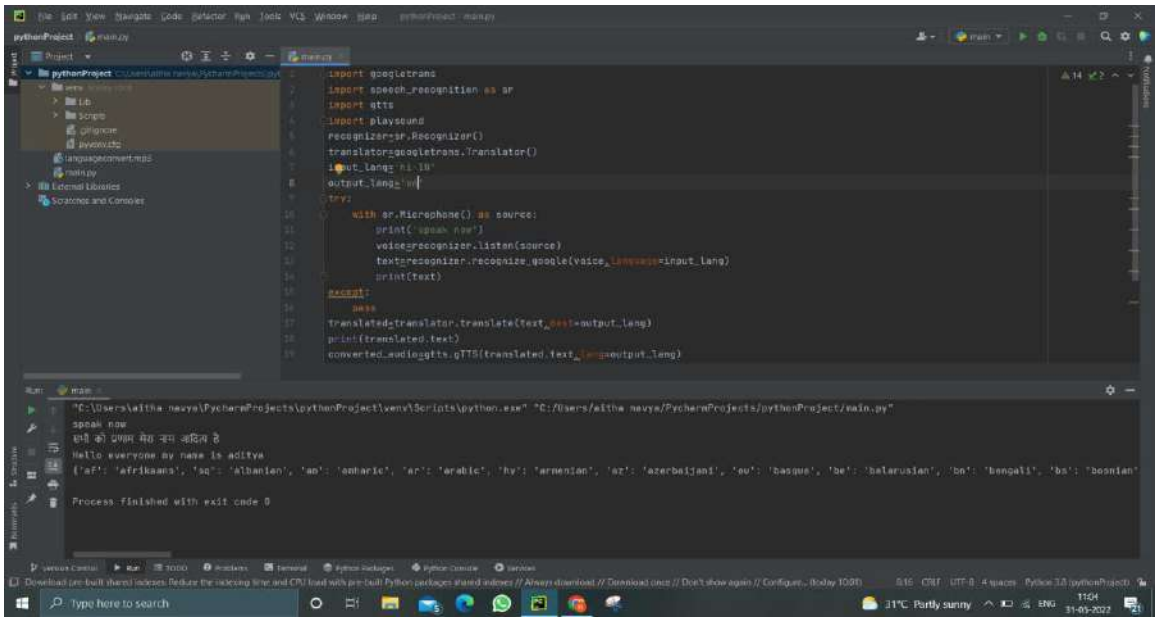
Screenshot 5.8 Save output audio for language convertor using python

The above screenshot explains about saving the output audio.Till now we came to know only upto displayed output text.Now we will convert that output text into audio form and save it in a mp3 file.As we click on run button "speak now" essage appears ,after speaking something that input audio will be displayed as text on screen and after conversion to destination language ,output text will be printed on screen.Then that output text will be converted into audio form and will be saved as ".mp3" file.That mp3 file will be always visible as a file in our project.



Screenshot 5.9 playsound for language convertor using python

The above screenshot explains about playing the sound.Previously saved mp3 file will be played using playsound i.e. output audio is listened.



Screenshot 6.0 Sample output for language convertor using python

In the above screenshot it shows the conversion from one language to another.The input language was hindi and output audio language was english

6. TESTING

6.TESTING

6.1 INTRODUCTION TO TESTING

An estimate says that 50% of whole software development process should be tested. The errors that are occurred may destroy the entire software. Software testing is done while coding by the developers and through testing is conducted by testing experts at various level of code such as module testing, program testing, in-house testing and testing the product at user's end. Early discovery of errors and their remedy is the key to reliable software.

6.2 TYPES OF TESTING

- **UNIT TESTING**

  Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

- **INTEGRATION TESTING**

  Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

- **FUNCTIONAL TESTING**

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following ite

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Systems/Procedures : interfacing systems or procedures must be invoked. Organization and preparation of functional tests is focused on requirements, key functions, or special test cases.

7. CONCLUSION

7.CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

- The research on the above have shown that we can use the concept of python in this project very efficiently.
- This project helps us for conversion of speech of one language to another language prefered by the user.
- Our System provides support for multiple languages.

7.2 FUTURE SCOPE

- Automated Translation will be the new standard
- Translators will be using Artificial Intelligence

8. BIBLIOGRAPHY

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8.2 WEBSITES

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[3] https://www.researchgate.net/publication/3457553_The_ATR_Multilingual_Speech-to-Speech_Translation_System

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8.3 GITHUB LINK

https://github.com/Aditi160155/language-convertor-using-python

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LANGUAGE CONVERTOR USING PYTHON

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ABSTRACT

The most common form of communication between humans is Speech and communication plays a key role for delivering information. The fact is that every particular individual in the world will not have conversation in same language, many individuals will be speaking in many different languages. Summarizing the required content and delivering correct message is very much important.. If the information required is not delivered properly than many complications may occur. If either side of the communicating persons is unaware about the language then the cycle of speech will be incomplete. Hence we need a system that will solve our language barrier issue. So we came up with a system i.e. "Language Convertor using python" which will convert speech of one language into another language using python.

Keywords: Speech To Speech, Gtts, Microphone ,Speech Recognition, Machine Translation.

I. INTRODUCTION

The project is titled as “Language convertor using python”. The system will provide us the source to understand unknown language information by converting it into our required language. This project uses python for conversion of one language audio into another language audio. Google trans,speech_recognition,gtts,playsound are the main properties that are to be used in this project. Consider there is a video in a particular language that is not understood by a user ,and user wants to access the information in that video, so by our system we can access the required content , so we need to select the output language i.e. language that the user can understand and convert it using python. Conversion will be done using various functions such as Recognizer(),Translator(),listen().

II. METHODOLOGY

Language Conversion has started in early 15th century. Applications, taking an example: Siri an intelligent automated assistant which will facilitate user interaction within a device, and helps the particular individual more effectively by engaging with remote services [1] makes use voice recognition and text-to-speech (TTS).Technology. Machine Translationis a field of Artificial Intelligence that deals with translation of a particular audio from one language to another[2].There has been many methodologies for this system. Hybrid MT is one of the methods which is a combination of multiple machine translation approaches within a single machine translation system[3].The main step in our system is to recognize the speech that was spoken by the individual, it can also be achieved using Neural network based approach. This approach will be mostly used for complicated recognition tasks[4].Another approach that can be used is hidden markov model (HMM) for our system. HMM consists of techniques for acoustic modelling in speech recognition systems. It gained value due to its accuracy in recognition and its analytical ability.

III. MODELING AND ANALYSIS

The main aim of this project is to convert the language spoken by a person into another language audio .For that initially we need to give voice input .consider that we are giving our voice input in Hindi language and we need output language as English. what the system will do is initially it will enable the microphone. Then by using recognizer. listen() it will recognize our voice and store in variable “voice”. Then the recognized input voice will be converted into text using “recognizer. recognize_google()” and converted text will be stored in “text” variable. This is what happens in “Convert Speech to Text” block. Next we will be using Google Translate to convert this input text into text of output language i.e. English. Now the output text has been obtained now we have to convert this output text into speech form. We will be using gtts.gTTS() to convert the output text

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into speech. We will save this audio output in an mp3 file. Then we will use playsound. playsound() to play the audio output obtained .This is what basically happens in “convert text to speech” block. Then audio output will be obtained.

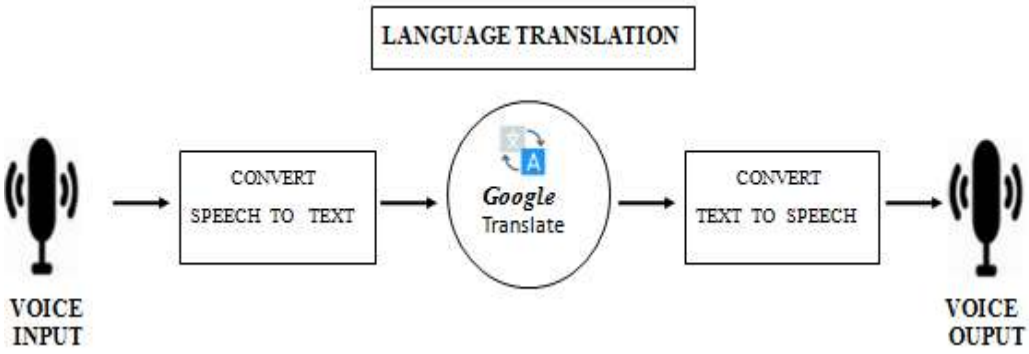
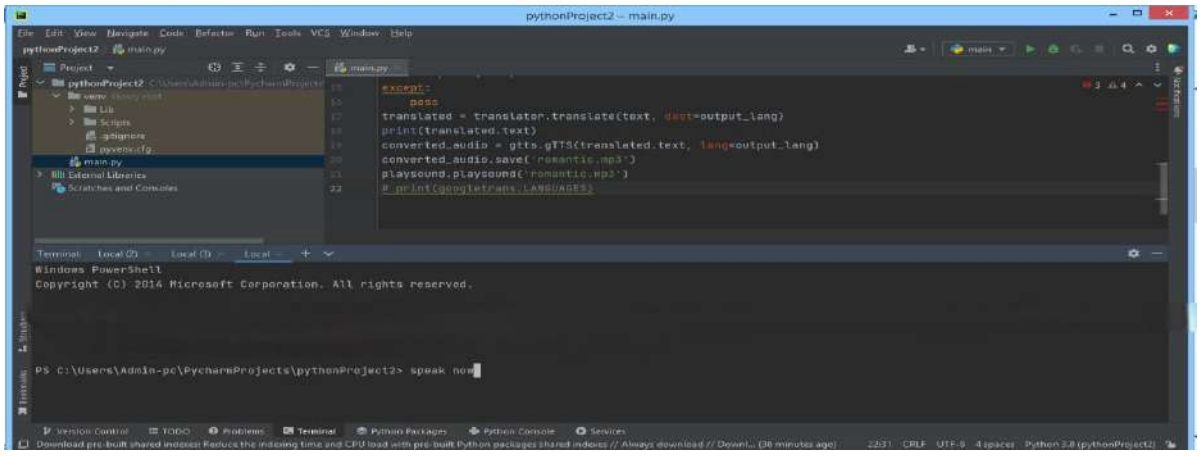


Figure 1: Project Architecture for Language convertor using python

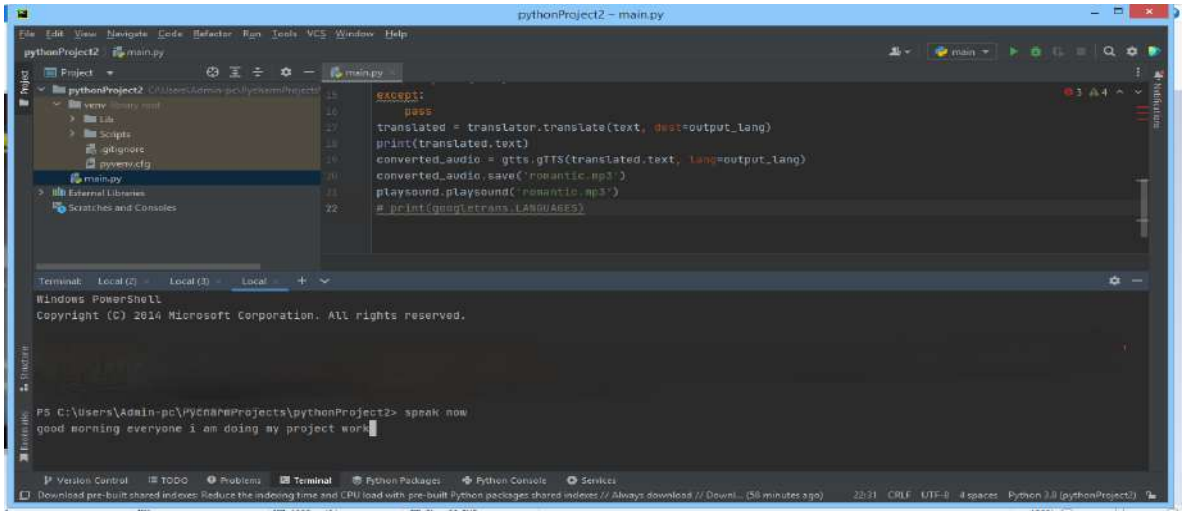
IV. RESULTS AND DISCUSSION

As soon as we compile the code "speak now" message appears on screen



Screenshot 1 Display Screen for language convertor using python

After "speak now" message appears, we need to speak something of any language(say english) and it will appear on screen.



Screenshot 2 Input Screen for language convertor using python

Now that english text will be converted into text of another language preferred by user (say hindi) and it will be displayed on screen and audio of output text will be played.

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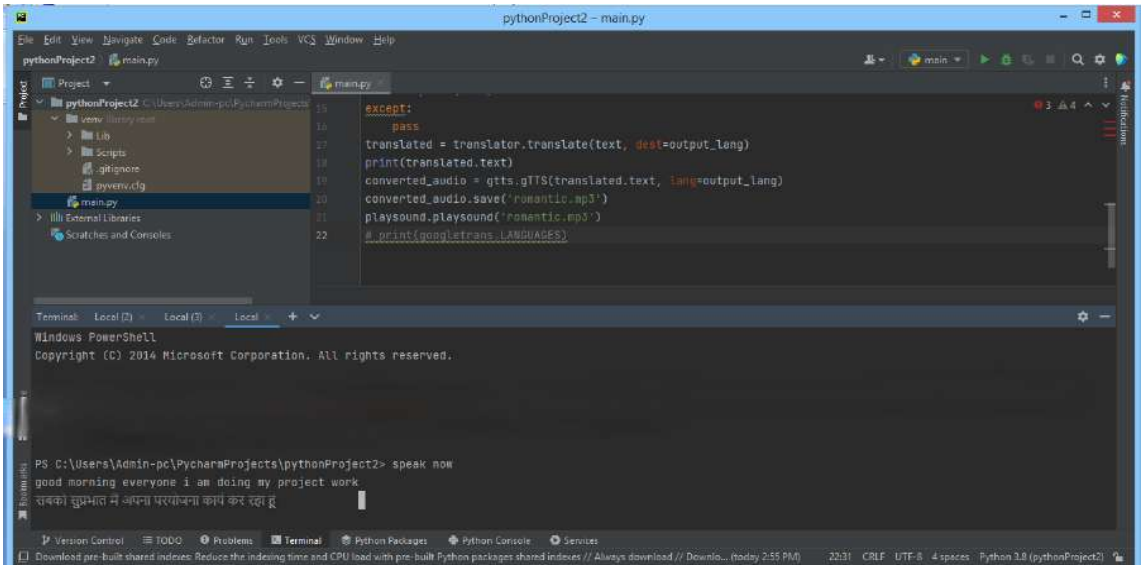

Screenshot 3: Output screen for language convertor using python

V. CONCLUSION

The research reflects an innovative approach to adding features to language convertor using python with unlimited vocabulary and including all languages. This system can effectively deliver the required output audio by converting the input audio into our preferred language. The research also shows that the concept of gtts and python can be used much more effectively in this project. Instead of providing conversion for limited languages our system takes all languages in the world into consideration.

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